GUIDE FOR MAKING AN INDUSTRIAL REVENUE BOND WATER MANAGEMENT PLAN

Efficient water management by a large, nonresidential customer requires knowing how, where, and when water is used. This will vary, not only from customer to customer (even if it is the same type of business), but also from department to department within a business. Finding creative ways of managing operations and delivering products, instead of relying on customary procedures, is the core of efficient water management.

To complete a water management plan, follow the steps below. Use suggestions and reminders given with each step to scrutinize existing and/or projected facilities and operations. Provide the information requested. Not all the water uses given will be applicable to the business for which the plan is being developed. This guide is broad due to the variety of businesses applying for Industrial Revenue Bonds. Therefore, include only those water uses appropriate to the business for which the plan is being written.

STEP 1) Review site plans and plumbing plans. Please report the number of meters and sizes of water lines to the existing and/or projected buildings.

STEP 2) Identify where water is being used. There are four major areas in which water is used: 1) Domestic; 2) Cooling and heating; 3) Process; and 4) Landscape. Please identify in each of the four areas where and how water will be used. Identify the types of water using devices, the numbers of each device in the facility and the volume of water consumed by that device during each use. Ways to determine the volume of water use are as follows:

- ** Read facility meters.
- ** Sub-meter where necessary.
- ** Make field measurements. A stopwatch and a container of known size can be used to determine gallons per minute (GPM).
- ** Look up equipment references or call the manufacturer.
- ** Compare recent experiences of staff.
- ** Using a stopwatch read the meter before and after turning off a particular large water use.
- ** Set up and monitor electronic flow meters for a set period of time.

To guide you in determining where water is being used, the following list is given. It covers each of the four major areas, but is by no means comprehensive. Be on the look out for uses that are overlooked due to the unique processes of your business.

SECTION (A) **DOMESTIC** – this is water used for personal hygiene, food preparation, and drinking for both humans and their animals.

Washrooms - public and private. List the number of toilets, faucets and urinals. Report the water use for each (gallons per flush - GPF, or gallons per minute - GPM) device, the make, model, and manufacturer of the apparatus.

Locker rooms - List the number of showers, baths, toilets, faucets and urinals. Report the water use in GPF or GPM for each device. Note the make, model, and manufacturer of the equipment.

Laundry - Give manufacturer listed water use for make and model type of the machines. Report other

water uses (sinks, faucets, & etc.), along with the GPF and GPM for each.

Drinking Fountains - List number of fountains located on the premises, along with water use, the make, model, and manufacturer. Report if these run continuously or if they are on demand (have an on/off valve).

What volume of drinking water do animals use and how is it delivered?

Kitchens/Break rooms/Lunchrooms - List the number of sinks, garbage disposals, steam tables, cold tables & other water uses. Give the GPF and GPM for each along with the make, model, and manufacturer. Include pounds of ice used by the cafeteria serving cold tables and water used as food products are cleaned, thawed and handled.

Dish Washing - If manual, report the GPM rate of the faucets. If automatic machines are used, report manufacturer listed water use, the make, model and age of the equipment.

Swimming pools/Spas/Whirlpools/Jacuzzi - List volume. State how often each will be drained and refilled. Give filter type and manufacturer. Note how often the filter will be back washed and how many gallons of water that will require. State whether or not a cover will be used and under what circumstances the cover will be in place.

Leaks - Pay attention to leaks. They appear innocuous but can account for as much as 25% of the facility water use. Leak prevention is basic to any water management plan. Please give a statement as to what the leak policy will be.

Other water uses - The list given above is not a complete one, therefore look for other uses. Please attach list of other water uses, giving amount used and make, model, manufacture and age of the water device. Water use is habitual and done with little thought. Becoming water aware requires some effort.

SECTION B) **COOLING/HEATING** - Water has a high specific heat that makes it ideal for heat transfers. Does business/industrial facility currently use or is it planned that it shall use water for cooling or heating processes? If so, please develop water management plan for the cooling or heating process.

Cooling

List make, model, manufacturer, and age of the system or appliance.

State whether it is single-pass/once-through cooling or closed loop cooling for air conditioners, evaporative coolers, cold rooms, walk-in refrigerators, freezers, drinking fountain chillers, ice-making machines, industrial plant equipment cooling (examples: molds, compressors, vacuum pumps, welding, cutting saws, & etc.), morgues, X-ray machines & etc.

List amounts of water used, in gallons, by each system or equipment.

Give cooling tower blow down and make-up water amounts in gallons.

Heating

List make, model, manufacturer, and age of the system or machinery.

Give amounts of water used in boiler blow down and make-up water

State the amount of heating system monthly make-up water.

SECTION C) **PROCESS** - this is water used to make and deliver a product. There are six basic areas ways water is used in processing: 1) Materials Transfer; 2) Rinsing and Washing; 3) Pollution Control/Waste Disposal; 4) Use as Ingredient in Product; 5) Environmental Modification; and 6) Leaks - unaccounted for water. Please state for each of the six areas how water is used in your business processes and give the volume of that water for each method.

Materials Transfer - the transport of ingredients or products, such as pulp in a paper mill or vegetables in a water fume at a food processor.

Rinsing and Washing - this is for transporting contaminants away.

Cleaning floors and walls

Commercial laundries
In-house laundry
Scrubbers for cleaning product and ingredients
Sterilizers
Washing of equipment

Animal cages	Windows	Dish/container washing
Machinery	Vehicle washing	Tables/work surfaces
Conveyor belts	Laboratory glassware	Large industrial plant tanks

Pollution Control/Waste Disposal

Air handling units	Carrying waste to sanitary sewer
Cleaning stack emissions	Controlling dust
Floor drain priming	Returning process chemicals for reuse

Use as an Ingredient in Product

Beverages and food products	Cosmetics	Chemicals
Ice	Pharmaceuticals	

Environmental Modification - some products need a certain level of moisture during the manufacturing process.

Evaporation	Humidification	Incubation

Leaks - unaccounted for water

SECTION D) **LANDSCAPE** - Will the business/industrial facility be landscaped? Will landscaping be irrigated? If the landscape is to be irrigated, please develop an irrigation water management plan.

Irrigation - note what types of vegetation are being watered and the watered area size. Note the type of irrigation (drip irrigation vs. overhead spray) and how it is scheduled.

Fertilization and Pest Control - water is used in chemical applications. Note the volume used. Add in that which is used for equipment cleaning.

Plant Reproduction - water is used in the plant nursery and greenhouse. How is the water delivered? Where is it used? Note volumes and schedule of irrigation.

Decorative Water Features - Give type, pump size, whether it is a recirculating or once-through mechanism, volume of water, and amount of make-up water per month.

STEP 3) Identify and report the areas where water use reductions will take place so that this facility will be more water conservative than a conventional facility. Look for methods that work best for each water use situation. Set a timetable for the implementation of these methods. There are three ways to bring about efficient water management.

** **Change the process.**
** **Change fittings or equipment.**
** **Create a water-wise environment to remind employees and the public to conserve.**

Suggestions, which might be used for more efficient water management in the business environment, are given for each of the four major areas of water use. This is for your convenience, but, again, this list is not comprehensive. Please keep in mind that new technologies are continually being created.

SECTION (A) **DOMESTIC** - Given below are procedures and methods, which if incorporated into your business/industrial facility, will reduce domestic water use or allow for water use to be more efficient. Please consider these as you draw up the section for domestic water management.

- Adjust equipment to use less water.
- Replace old and worn fixtures/fittings such as toilet flapper valves or other water fixture seals.
- Meter large water uses separately

Buildings	Pools/fountains
Landscape	Manufacturing processes

- Install new low-flow devices and fixtures.

Low flow faucet aerators/flow restrictors	Low flow showers/flow restrictors
Toilet dams/tank displacement bags	Toilet flush reduction devices
1.6 gallons per flush toilets	1 gallon per flush urinals
Ultra low water use dishwashers	Front loading laundry machines

- Install water line pressure and/or flow reduction devices
- Use spring or infrared activated faucet valves. This also applies to drinking fountains.
- Set up regular maintenance schedules.
- Repair leaks immediately.
- Cover swimming pools, spas, hot tubs, and/or Jacuzzi when they are not in use. The only water lost should be to filter backwash and patron use.
- Pool cracks, seams and joints are to be regularly checked and caulked. Have a regular maintenance schedule for gate valves, check valves, & etc.
- Reuse water where feasible and appropriate.

SECTION B) **COOLING/HEATING** - The following are suggestions for making the use of water in heating or cooling systems and/or appliances, more efficient. Please feel free to incorporate these or any other efficient water use methods into your heating or cooling processes.

- Require separate meters on make-up and bleed-off water lines for cooling towers and heating systems.
- Make-up water to cooling tower systems can be reduced by controlling the recirculation rate to match the cooling demand, and by close attention to the addition of chemicals into the system.
- Require a minimum number of cycles of concentration for cooling tower water.
- Use air-cooled refrigeration rather than once through water-cooling.
- Modify cooling tower tank system to reduce overflow.
- Eliminate all uses of single-pass cooling water by installing closed loop cooling systems, or control flow to match cooling demand.
- Follow manufacturer water use recommendations for cooling and heating systems.
- Repair leaks.

SECTION C) **PROCESS** - Please develop a water management plan for all processing water uses which are or shall be in place in this business/industrial facility. List all applicable water uses and include gallons per use. For large processes this can be given in daily (24 hour) increments or even weekly increments. Please include all methods and efforts that are in use or shall be used to reduce water consumption. A partial list of such methods is given for your consideration below:

- Use reclaimed water for dust control, compaction, or sidewalk cleaning.
- Provide improved methods of cleaning equipment.
- Use controlled, pressurized floor-cleaning processes. Sweep with brooms where possible.
- Recirculate water to vacuum pumps and compressors.
- Along with the variety of water uses in processes comes variation in water quality requirements. Not all processes need the same type of water. For example, river water can be used for cooling tower make-up water. The following are the different types of water:

Potable water	Ultra-pure water
Recirculated water	Reclaimed water

- Install control valves.

- Always use spring-activated controls on cleaning hoses so that they are automatically shut off when not in use.
- Purchase computerized washing machines that have water level controls.
- Reuse soapy water in the laundry or recycle the last rinse water into the next wash cycle. This can also be done with dishwashers.
- Automate shut-off valves and sensors on dishwashers.
- Reduce the water flow rates where possible in processes.
- Repair leaks immediately.
- Control continuous water flow to drains.
- Monitor and automate water use where ever possible.
- Develop and use regular maintenance schedules.

SECTION D) **LANDSCAPE** - The following are recommendations from the horticultural industry that can be used to make landscape water use efficient. Please consider using those applications that are feasible for the current or future facility.

- Meter landscaping water uses.
- Storm water collection in retention ponds can be run through a filtration basin for use in an irrigation system.
- Decorative water features can use recycled water or storm run off.
- Soil moisture should be used as the guide for irrigation scheduling.
- Set sprinklers properly. Don't irrigate concrete.
- Do not irrigate the hard to water areas such as long narrow strips or steep inclines.
- Install pressure regulators/compensators in sprinkler heads or on each zone. Set the system up with matched precipitation rates.
- Install rain sensor shut-offs on the irrigation system.
- Clean and maintain sprinkler heads.
- Fix line and sprinkler breaks or leaks immediately.
- Apply the principles of Xeriscape^{R} in the landscape. Xeriscape means "water conservation through creative landscaping" and is achieved by following seven principles:
  1) Plan and design carefully.
  2) Improve the soil water holding capacity through use of soil amendments.
  3) Use efficient irrigation methods and equipment.
  4) Select drought tolerant, hardy plant materials, then group these according to their sun, soil, and moisture needs.
  5) Use turf grass appropriately in locations where it provides functional benefits.
  6) Mulch.
  7) Give appropriate and timely maintenance.
- Use evapotranspiration to guide irrigation scheduling.
- Change irrigation scheduling weekly as local weather dictates.
- Zone irrigation so as to mirror the type of plant groupings.
- Use drip irrigation with all trees, shrubs, annual and perennial beds.

STEP 4) **EDUCATION** - Please give a statement as to what the policy on employee and public water conservation education will be. Given below are suggestions that you are free to incorporate, along with any ideas original to your place of business.

- Hold semi-annual meetings with employees, tenants, and/or clients where water conservation in the business is the topic.
- Post signs and bright colored posters to draw attention to areas around the facility where

conservation is important.

- Have employees and/or tenants draw up their own water management plans for the area in which they work.
- Give out awards for best management practices implemented in the workplace that uses water conservation.
- List out the water conservation methods currently in place and being used. Promote the monthly or annual volume of water saved (not used).

A FINAL NOTE: A water management plan allows water efficiency measures to be phased in over time, especially where the up-front capital costs are large. The "Payback Period" (capital cost/net annual savings) can be figured for budgeting purposes and to determine which water efficiency measures are the most cost effective improvement projects. Total Savings (annual water savings + annual sewer savings + energy savings + other savings) can also be figured, as well as, net annual savings (total savings - annual O&M costs).

Having a water management plan makes good business sense now and in the future. Water and its associated sewerage costs have historically not been priced according to true costs. This can no longer be the case due to increased demand on fresh water resources, coupled with pollution pressures. Water will continue to become a larger portion of the costs a business or institution incurs as it serves the public. Efficient water management by business and industry is cost-effective. It helps companies by not only reducing water costs, but potentially reducing the costs of sewerage service, chemicals, energy (hot water, pumping costs), and other overhead expenses as well. Minimizing costs in whatever ways feasible will provide the competitive edge businesses need.

Water conservation is also good public relations. Residential customers who have been asked to conserve expect that these efforts be fairly shared with the business community. Nonresidential customers represent a significant portion of the typical utility's customer base, accounting for any where from 20 to 40 percent of total water sales. (Wichita - 41%) These customers use considerably more water per site than do residential households. Therefore, one nonresidential customer's decision to implement water conservation results in a larger water savings, the protection of critical community water resources and is the hallmark of a good neighbor.

STEP 5) Please submit the completed water management plan to:

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